TensorFlow

TensorFlow & Deep Learning SG

First steps in Deep Learning with TensorFlow 2.0 :

CNNs

RED DRAGON AI

TensorFlow

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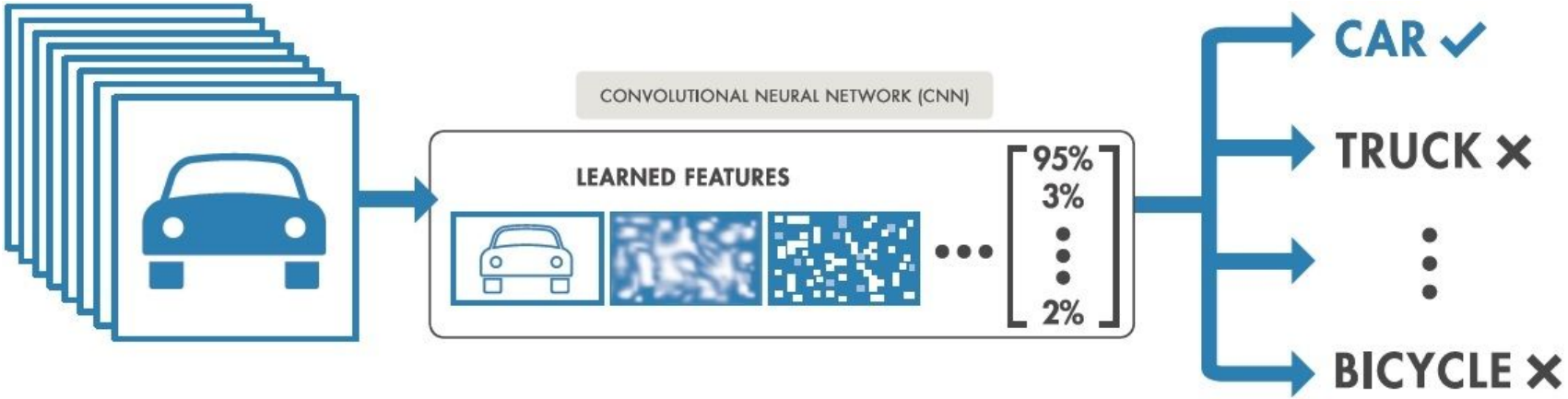
RED DRAGON AI

Outline

- Image classification : The problem
- What are CNNs?
  - Code-first explanation
- Why is a CNN model trainable?
- Let’s train a model
  - Standard thing
  - Less standard thing
- Wrap-up

The Problem

Image Classification



What are CNNs?

Convolutional Neural Networks

- Translational invariance
  - ... yada yada yada ...

- Instead, let's understand what these things **do**

Code

We have the layers...

How does the model learn?

- We need a few more pieces :
  - List of Parameters
  - Training data (i.e. correct answers)
  - Optimisation
  - Testing

List of Parameters

- We've seen this already :
  - Each Conv2d has a kernel (+ bias term)
  - (ReLUs and SoftMax don't need parameters)
  - ... that's it

Training Data

- We'll see this soon :
  - Lots of images and their correct classes

- Split the data into 'training' and 'test' portions
  - Ensures that model works on unseen data

Optimisation

- This is a bit more involved...
- Key piece of mathematics :
  - Measure the model's error (= 'loss')
  - Want to reduce the 'loss' to improve model
  - But 'loss' depends on every parameter
  - Repeatedly nudge each parameter in correct direction
  - Model should improve (may be slow)

Testing

- We kept some testing data to one side :
  - (more images and their correct classes)

- We'll see whether the trained model works
  - (fingers crossed)

Code (again)

Wrap-Up

- Basic CNN components shown
- Basic CNN model built

  (Hands-waved about training)

- Model trained on 2 datasets
- Success!

Questions?

Deep Learning MeetUp Group

The Group :

- MeetUp.com / TensorFlow-and-Deep-Learning-Singapore
- > 3,600 members

The Meetings :

- Next = ?-May, hosted at Google
  - Something for Beginners
  - Something from the Bleeding Edge
  - Lightning Talks

RED DRAGON AI

Deep Learning JumpStart Workshop

April 25+26

- Hands-on with real model code
- Build your own Project

Action points :

- `http:// bit.ly / jumpstart-april-2019`
- Cost is heavily subsidised for SC/PR

Advanced Deep Learning Courses

Module #1 : JumpStart (see previous slide) *or GitHub*

Each 'module' will include :

- In-depth instruction, by practitioners
- Individual Projects
- 70%-100% funding via IMDA for SG/PR

Action points :

- Stay informed : `http://bit.ly/rdai-courses-2019`

Red Dragon AI : Intern Hunt

Opportunity to do Deep Learning “all day”

Key Features :

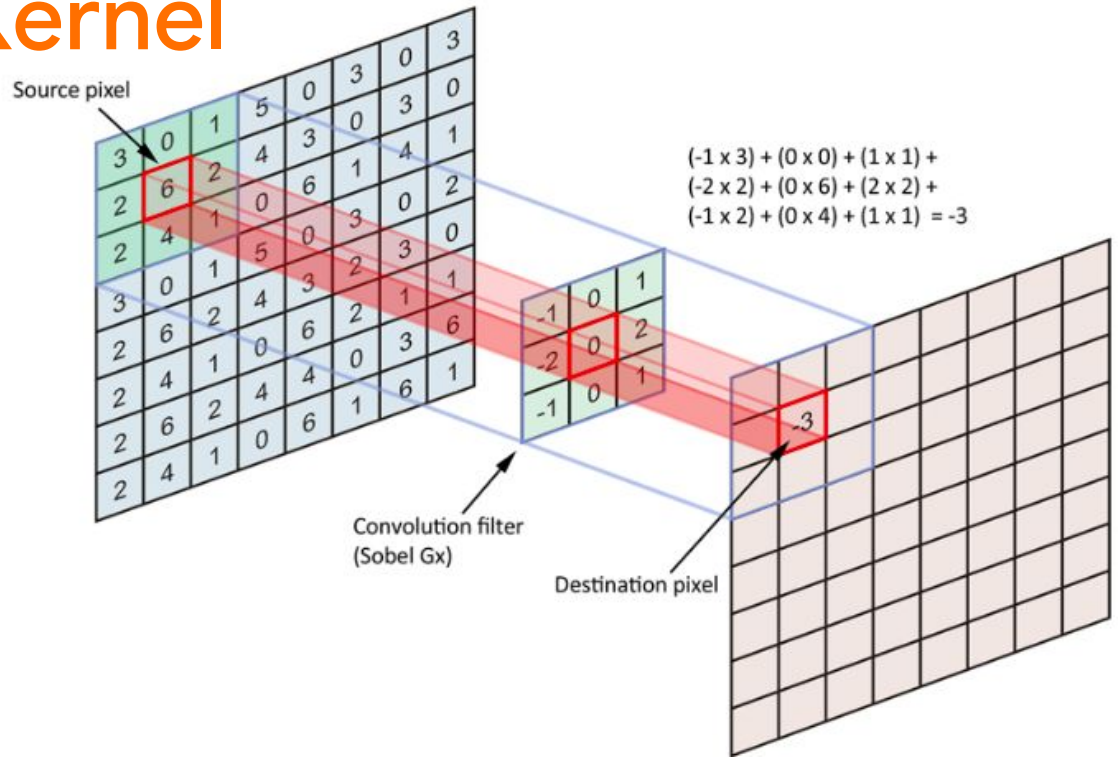
- Work on something cutting-edge (+ publish!)
- Location : Singapore (SG/PR FTW) and/or Remote

Action points :

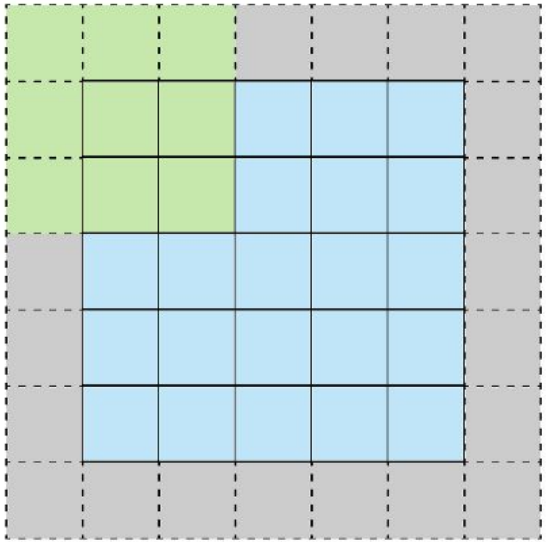
- Need to coordinate timing...
- Contact Martin or Sam via LinkedIn

Extras

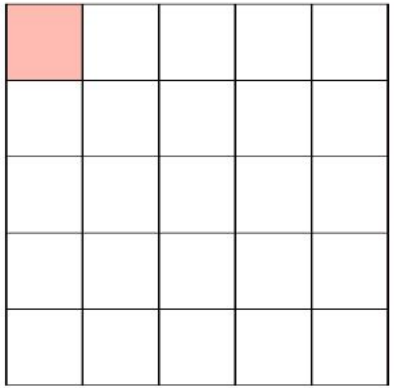
CNN 3x3 Kernel



CNN stride=1 (with padding)

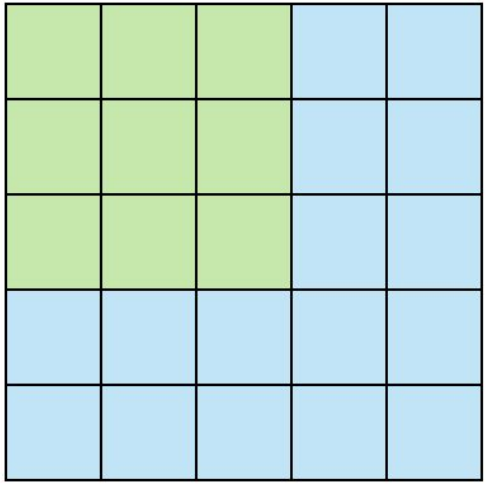


Stride 1 with Padding

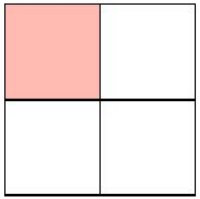


Feature Map

CNN stride=2 (no padding)



Stride 2



Feature Map